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TEACHING PRACTICE NOTE

Silence in the Kitchen: How Students Innovated and Created despite COVID-19

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Abstract

The COVID-19 lockdown has changed the educational landscape forever; everything that we thought we could not do online, it turned out we could. When the Irish Government announced that all third-level educational institutes were to close in March 2020 and that lecturers would move theory-based lectures online, it seemed a daunting challenge. Most lecturing staff had little experience of lecturing with online platforms and no time to prepare the students for new ways of working and attending class. Little did we know that twelve months later, as the crisis raged on, that an even bigger decision had to be grappled with – how to run a kitchen-based product development class virtually? It was really a leap of faith for both the lecturers and the group of students involved. We thought we could not run practical classes if the college closed, it turned out we could. We thought we would never get the students to innovate in their home kitchens, they did. We thought the students could not engage with product development using ingredients from their cupboards, they could, and they did. The module proceeded online, and the results provided innovative products, engaged students, and exceptionally surprised lecturers.

The School of Culinary Arts and Food Technology (SCAFT), one of the schools comprising the College of Arts & Tourism within Technological University Dublin (TU Dublin), is the leading dedicated centre of learning and teaching in culinary arts, bakery, food product development, bar management, gastronomy, and oenology within the Republic of Ireland. It offers internationally recognised programmes which are unique, challenging, dynamic and innovative.

The Master's degree in Culinary Innovation & Food Product Development was the first level-nine programme developed by the School of Culinary Arts and Food Technology, in the Dublin Institute of Technology (DIT) — now Technological University Dublin (TU Dublin) — and it was unique in Ireland and Europe. Its validation in 2007 was a big step, as at the time the school had only one level-eight degree programme (BA (hons) Culinary Arts) and several higher certificate programmes. The programme was designed to enable students with a culinary arts degree to continue their education to master's degree level, it was also an opportunity to develop a pool of talented innovation chefs to facilitate the growing demands of the food industry in Ireland and the ever-changing fashions in food requirements world-

wide. Initially the entrants on the programme came from a culinary background but this changed over the years as nutritionists, food scientists, dairy scientists and culinary lecturers looked to enhance their knowledge in this area. The MSc runs as a part-time programme over two years and as a full-time programme over one year and is currently in its fourteenth year.

The Programme

The master's programme consists of ten modules and a dissertation. In semester one the students complete Culinary Innovation and Food Product Development Concepts; this module provides the student with an insight into the development of new and novel food products for the food service industry and the food retail markets. During the module they are given a brief that requires them to develop an innovative concept. The focus of the brief changes from year to year depending on the trends and developments in the food sector.

The Module - Prototype Development and Evaluation

In semester two the students undertake a second module: Prototype Development and Evaluation, a 48-hour module that is practice-based and takes place in a kitchen laboratory. The aim of this module is to further develop the concept and to produce a successful new food product. This module is designed to help students to synthesise the theoretical and applied knowledge in developing a novel and sustainable food product.

In 2020, the focus of the brief for the part-time students was to produce a sustainable new food or beverage product by reducing or replacing ingredients from animal sources with plant-based alternatives. Meanwhile, the full-time students focused on the design of an innovative snack concept that used new flavor and texture combinations.

For the module assessment the students were expected to keep a detailed logbook over the period of the development work, produce a written report detailing aspects of the sensory analysis undertaken, indicate shelf-life and provide packaging and labelling in line with current Irish legislation. At the end of the module a showcase is normally held where the students can display their work and invited industry experts give them feedback.

When the semester began, we initially thought that the classes would be held on-site, and students would work in the university kitchens. However, due to the dramatic increase in COVID-19 case numbers in the December/January period, to protect the staff and students, it was decided to reduce numbers in the kitchen by dividing each cohort in two and students would travel to the college on alternative weeks. By the end of the week, the landscape had changed yet again. Due to a government-imposed lockdown, two lecturers, a group of ten full-time and nine part-time students participated in the module while working from home and fully online.

The Teaching Team

Team teaching was a new approach for the lecturing staff on this module, as although we work closely with each other, we work alone in our respective kitchen laboratories with our assigned group of students. Each lecturer has their own style and way of doing things. They also have different strengths due to their backgrounds in the food and hospitality industry and the food manufacturing industry, respectively. This proved invaluable when the module went online as it allowed multiple perspectives on a particular issue. We also noticed that this approach increased student engagement and participation, which in turn increased the inter-group communication and a mutual respect for alternative views and ideas began to appear. The lecturers involved in delivering this module were Anna Cruickshank and Pauline Danaher. The platform MS Teams was used for a weekly online class meeting and Brightspace, the virtual learning environment for TU Dublin, was used to upload the documents for the module. Each meeting was recorded, and the link was made available to everyone. Students and lecturers involved agreed to the recordings. This allowed the group to listen back to the class if they were unavailable to attend at the designated time due to family commitments or illness. This resource proved especially useful as the semester progressed when several students contracted COVID-19 and needed time away from their studies.

Anna Cruickshank is a Senior Lecturer in Culinary Innovation and Food Product Development. Her educational background in Food Science and Engineering Technology gave her a broad base on which she established her career in the food industry in the chilled ready-meals sector. She lectures in the areas of Culinary Science, Food Innovation and Development and is chair of the MSc in Culinary Innovation and Food Product Development. Within this programme, she works to build on the strong relationships between individuals, society, and economy, providing a holistic overview of food innovation from local to global scale. Anna is also a member of the highly successful Erasmus Mundus consortium that delivers the Master's degree in Food Innovation and Product Design.

Pauline Danaher, an award-winning chef, has been a lecturer in Culinary Arts for over 23 years. She was involved in the development of the Bachelor of Arts in Culinary Arts in 1999 and has worked as a tutor on the programme for many years. Pauline holds qualifications in professional cookery, advanced pastry arts, and a Bachelor of Science in Education and Technology. She completed her Master's degree in Culinary Innovation and Food Product Development in 2012 and now lectures in the areas of Culinary Innovation and Molecular Gastronomy. She has many years' experience mentoring students and teams entering national and international cooking competitions, with tremendous success. She has published in culinary textbooks, written book chapters and peer-reviewed articles on molecular gastronomy and culinary education. She has presented papers at many international food conferences.

The weekly lectures

27th January 2021 Introductory Meeting

It was with some trepidation that the teaching team held an introductory meeting on Microsoft teams (MS Teams). We were unsure as to how the students would react when told that all work would be completed from home, and all contact would be online. Students were informed that they were now required to develop further their initial concept and produce a prototype. Due to the constraints, such as working from home and not having access to the specific equipment needed to carry out certain tasks, students were informed that they would have to be resourceful. Working as a team, both students and lecturers would discuss issues as they arose and generate ideas and solutions. Thinking “outside the box” to produce the prototype was emphasised throughout the meeting – the development process would be as important as the prototype. As there was less control over the environment where the work took place, students were reminded to adhere to all food safety precautions when carrying out tastings and sensory analysis. The learning outcomes of the module were explained in detail and what was expected for each outcome. We asked students to reflect on their concept regarding any changes since their initial idea; had the concept evolved? We also asked had they learnt anything new about their concept from other modules they had completed, and had the ingredients changed from their initial idea? Finally, students were encouraged to stay in contact with each other as the group has a wealth of knowledge which they could tap into if needed. The meeting proved to be very positive, with students engaged in the process and two very relieved lecturers.

3rd February 2021

To give insights to the materials and methods that could be used in product development, a workshop was hosted by Shannon Dickson, an assistant lecturer in culinary arts with over twenty years' experience in the food industry in Ireland, Canada and Australia, and research interests in bakery science, technology, and applications as well as food product development. The main objectives of this session were to explore recipe formulation and the use of innovative raw ingredients and processes. Shannon prepared a PowerPoint presentation, and shared this with the students using Brightspace, followed by a problem-solving exercise. Students were encouraged to discuss how substituting different ingredients could affect texture and taste, and any previous experiences they had with the ingredients. It was noted during this session that, in general, students participated, but did not turn their cameras on when talking and some only used the chat function. This was disappointing because it was difficult to gauge the reaction of the students to this class. In preparation for the following week, students were encouraged to produce their first prototype. This seemed a daunting prospect for many of them and was also a worrying time for the lecturers.

10th February 2021

This session was the first-time students had used MS Teams to present their work. There were some issues with connectivity and some technical solutions had to be quickly devised. The students were eager to show the work they had produced. Turning on cameras and using the share-screen tool, students showed their completed logbook, photographs and samples, they explained why they used certain ingredients and how they had improvised and used alternative equipment and processes. This session provided an opportunity to discuss difficulties they encountered, which in turn led to great engagement from their peers and a considerable amount of the class was spent problem solving and finding alternative ingredients and processes. For example, Figure 1 shows how one student used an old microwave oven to ferment his yogurt. Lecturers also gave constructive feedback and information about where to source ingredients, how to conduct shelf-life testing, and when to carry out sensory analysis. This was a new experience for the students, but it was also the first time the lecturing staff had undertaken this type of class activity online; we were extremely encouraged with the student's participation and preparation for the session, especially as they had no access to the usual facilities found in a commercial teaching kitchen. However, we also realised we needed to be more mindful of time management if we were to allow all students an equal opportunity to engage as only half of the group presented their work during the allotted time. We noticed that once they started to present, the student grew in confidence and the rest of the class engaged in constructive feedback with the presenter. We broke the session into one-hour slots to ensure students did not fatigue. After class, the lecturers met online to reflect on teaching experience and we both commented on how much we had enjoyed watching the students engage, debate and support the group.



Figure 1: Fermentation using a microwave as an incubator during the development of a plant-based vegan yoghurt

17th February 2021

This class provided the second group of students with an opportunity to present their work. Students had become proficient using MS Teams and started to insert videos and music into their presentations. During the session, the use of radar charts as an analytical tool for sensory analysis were discussed (see Figure 2), students were shown how to compile charts using Microsoft Excel, and flavour reference standards were also explained.

The first technical issues with the prototypes began to appear, moulds began to grow on the products, textures became gummy or grainy, products didn't ferment properly, and the list went on. As lecturers we were very concerned as to how we would overcome these problems. However, the students were up to the challenge, many had researched the library resources available online, others had spoken to industry experts and brainstormed for several hours to provide solutions. It was an exciting afternoon and a real sense of collegiality had developed. We moved from being lecturers to facilitators.

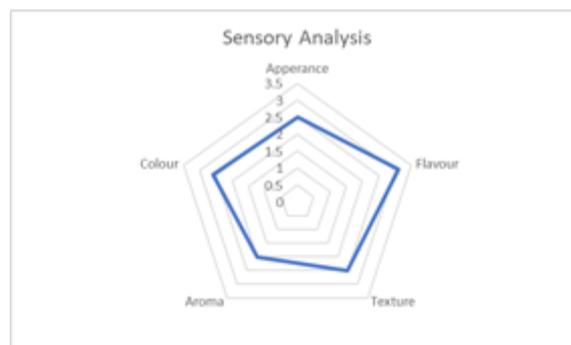


Figure 2: A radar chart displaying multivariate data

24th February 2021

Students gave further updates on their prototypes. We were extremely impressed with the progress to date, considering the restrictions that students were working within. The students were asked to briefly present the main points from their logbook, as it was felt that fatigue and lack of engagement could set in if there was too much repetition each week. The students, however, had a lot to discuss and had been in touch with each other over the course of the week and set about helping those who needed support by sending ingredients from Dublin that were difficult to buy in other areas of the country; those living close to the college collected some of the more unusual ingredients from the food stores in TU Dublin that were needed by students living further away. Books were collected from the library and sections scanned and disseminated to the whole class. We were delighted to see such support within the group. For the following week, students were asked to present an outline of their

report, as it was felt there was a need to change the focus from repeatedly presenting the logbooks. The students were also informed that a guest lecturer would facilitate the session in two weeks' time and in preparation they should reflect on the next step in the food product development process.

3rd March 2021

By the beginning of March, most of the students had developed a rough prototype and were now concerned with the shelf-life of the product. Normally, at this stage of the module, the students would have access to the microbiology laboratory, where they carry out basic tests to indicate bacterial numbers and identify yeasts and moulds that if present might reduce the shelf-life of the product. They would also test the acidity of the product using a pH meter. We needed to find another way for the students to carry out shelf-life testing, so we suggested using an app called google lens for identifying moulds growing on their products and buying pH soil testing kits from garden centres (Figure 3) to carry out pH testing on their product. Students who presented reports received feedback and suggestions on how they could improve them. Students were informed of Food Matters live webinars taking place the following week that they could go to as the lecturers had registered them to attend. Again, students turned on their cameras and were very engaged with the lecture, which gave us all an opportunity to see each other, and this felt great after a week of working in solitude. Students were informed that a mini showcase for their prototype would take place but the 'how and when' was yet to be decided.



Figure 3: Soil pH testing kit

10th March 2021

Fiona Walsh, a part-time lecturer and an industry expert in innovation and product launches was invited to chair the session. She held discussions with the students and provided individual feedback on each of the projects. This allowed the students time

to reflect on issues or technical difficulties they may have had. Fiona pointed out that developers do not work alone when in industry, they work as a team and have access to the quality assurance, technical, commercial, and marketing departments. The students were given an opportunity to discuss background research they had undertaken and how they planned to move their projects forward and also the packaging they might use. This lecture also provided a fresh pair of eyes and more technical knowledge in terms of flavour and packaging. Fiona provided some invaluable advice when she reminded students that not all projects will provide successful products due to technical or shelf-life difficulties, and it is important to acknowledge this and move on. Figure 4 shows how one student innovated by recycling a plastic container and printing his own label for the Coco-B Spiced Beetroot & Coconut Vegan Yogurt. Students were reminded that there was no class the following week as it was a National Holiday.



Figure 4: Recycled plastic container and sample label

24th March 2021

The students, by now, were very invested in their prototype and presented updates on their progress. Full of confidence, most gave live presentations from their kitchens showing their products, sometimes with background music and occasionally introducing passing family members; this proved to be very engaging for everyone and there was a notable increase in student-and-lecturer interaction. This lesson was by far the most rewarding session so far, with students demonstrating their innovation when overcoming obstacles, their creativity when working from home, and their much-improved presentation skills. As part of their sensory analysis testing, students would normally organise a panel of tasters to give them feedback on the product but due to the lockdown, they did not have access to other students. However, their ingenuity was astounding; when feedback for the product was needed some left samples and questionnaires on doorsteps of neighbouring houses; one used a nearby army platoon.

Others that were still working used several chefs in an industrial kitchen, and others used family or friends living in the house with them. The students were reminded of submission dates for completed work and there was an animated discussion as to how the “elevator pitch” to present their poster and product would be used in place of the showcase. A time limit of five minutes was agreed for each student and videos were to be pre-recorded and uploaded on to Brightspace. Pre-recorded videos were used to remove the concerns around technical issues that might arise during a live session and would also allow the external assessor to view students work. Students had a lot of questions on how they were going to present, and lecturers gave them numerous options. However, it quickly became apparent that we did not have all the answers. We began to brainstorm to produce solutions; by sharing experiences of using pre-recorded videos for lectures and sharing ideas on the use of different apps, the students were encouraged to find solutions to issues they thought they might face when producing their presentation. The key attributes required for the poster and the presentation were highlighted. Students were shown how to mirror their posters on MS teams using www.image2go.com as an example of how they could present their poster (a sample of the vegan yogurt poster is shown in Figure 5). This helped to alleviate some of the fears they had about making their final presentation. As there was little technical support available due to the lockdown, we spent a lot of time before class researching, using google, TED talks and YouTube videos, to get to grips with the technology that would allow the student to use the poster they designed as a backdrop to their presentation. This was unfamiliar territory for us all, but we hoped that over the course of the Easter holidays that the students would master the innovative technology needed to complete the assignment.

COCO-B "Spiced Beetroot & Coconut Based Vegan Yogurt"
School of Culinary Arts & Food Technology TU Dublin, Adam McDermott (D19124852)
Food Prototype Development & Evaluation TFPD 9022

Introduction
Coco-B, a uniquely flavoured, plant based vegan friendly yogurt packaged in a one hundred per cent compostable container. The flavour attributes offered throughout each spoonful of yogurt ensures the consumer experiences a distinct flavour blend, with the benefits of it being low in salt and allergen free.

Aims & Objectives
Aim: The aim of this report is to develop a new food product and outline the process from concept design and generation to product launch.
Objectives:

- Construct and develop a vegan yogurt recipe.
- Evaluate raw materials and equipment.
- Conduct sensory analysis with potential consumers.
- Adhere to all rules and regulations outlined by HACCP
- Conduct nutritional analysis of the final prototype.
- Develop packaging design and nutritional information.
- Shelf life testing and the storage conditions required ensuring the microbiological safety of the product.
- Determine line extensions and future developments.

Materials & Methods
Oat Milk

- Gluten free rolled oats, Water.

Beetroot Composite

- Beetroot, Nutmeg, Cumin, Bay Leaf, Maple Syrup, Agar Agar, Olive Oil

Coconut Cream & Oat Milk Yogurt

- Oat Milk, Coconut Cream, Lemon Juice, Maple Syrup, Vegan Yogurt Starter Kit, Agar Agar.

- Desiccated Coconut

Results & Discussion
The manufacturing of Coco-B underwent 10 weeks of product development to ensure the product was produced to the highest standard possible. The researcher faced numerous yogurt consistency problems due to the product not containing any dairy produce, but solved this problem by conducting numerous trial developments to give a yogurt consistency very similar to dairy yogurt.

Conclusion & Recommendations
Throughout the week-on-week development of Coco-B it allowed the researcher to experiment with recipes, alter and improve flavour combinations and adjust ingredients accordingly. Through rigorous testing and sensory analysis, Coco-B was developed ensuring all product and flavour attributes were formulated correctly. The final product and recipe was developed within the European Union statutory requirements, with all regulations adhered to. Throughout development and research of legislation, it enabled the researcher to gain a broad insight into the legal requirements associated with the development of NPFD. Recommendations for Coco-B include branching into vegan based yogurt desert. Choosing a snack like Coco-B satisfies many needs as well as providing a tasty, unique vegan yogurt to eat on the go.

References
Sokhane, K. S., Sarate, A. R., Koharagar, R. B. and Tase, A. T. (2019) "Studies on physical and chemical composition of beetroot" (Beta vulgaris L.), International journal of chemical studies, 7(2), pp. 283-285.

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I would like to thank Anna Criscolbank and Pauline Danher for their mentoring and support throughout this project.

General Yogurt Attributes
(SWEETNESS, FLAVOUR, TEXTURE, HEAVY)

Special Values	Per 100g	Per 100g Serving
Energy	400kJ	400kJ
Fat	1.5g	1.5g
Carbohydrate	12g	12g
Protein	1.5g	1.5g
Salt	0.01g	0.01g

Nutrition Claim

- Low sodium/salt

Coco-B yogurt has only one nutrition claim. The reason for limited health and nutrition claims throughout the product is due to the effects additional ingredients have on the fermentation process of the live cultures.

Figure 5: Poster Coco-B Spiced Beetroot and Coconut Vegan Yoghurt, by Adam McDermott

14th and 21st April 2021

The following sessions were dedicated to finalising reports and completing presentations. By this stage we had become familiar with Screencast, a digital video and audio recording of what occurs on a presenter's computer screen, and it can be used to create multimedia presentations. And the students had found several other helpful apps, they held their own tutorials and demonstrated how to use them. Now the students were learning more from each other than from us and it was wonderful to watch how they worked as a group and “left no man behind.”

Conclusion

The final session for the semester on the 28th April 2021 provided everyone with an opportunity to discuss how the module had developed over the course of the twelve weeks and to allow the students to give feedback and make suggestions that would continue to improve the module. The main themes that appeared during the conversation were that initially the idea of working on this module from home had been overwhelming for most, and that they had felt isolated and worried, also they had dreaded the first few presentations online. However, they soon realised that we were all in the same situation and the lecturers had been as worried as they were as to the outcome of the module. We had decided from the beginning of the module to cultivate a culture that would value every contribution; no worry or concern was trivial; if we did not know how to do something we would say so and only constructive criticism was permitted. This fostered a positive atmosphere within the class, allowed all to contribute and provided an atmosphere where problems could be aired and solved. They became a remarkably close group that encouraged and helped each other. The products that they produced were innovative and met the brief we had set. Their ability to present and use technology to do so was remarkable. It was a steep learning curve, but we now know that, with some collaboration, the impossible is often possible.